The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A method for measuring glucose in a body fluid of a subject, the method comprising:

measuring impedance of a first body tissue with at least one pair of an injection electrode for injection of electrical current into said first body tissue and a sensing electrode for detecting the ensuing voltage of said first body tissue;

wherein said injection electrode is in contact with said first body tissue or a second body tissue;

wherein said sensing electrode is in contact with said first or said second body tissue;

and determining the amount of glucose in the body fluid based upon the measured impedance.

2. The method of claim 1 wherein impedance of the first body tissue is measured with one pair of electrodes.

3. The method of claim 1 wherein impedance of the first body tissue is measured with two pairs of electrodes, each pair being an injection electrode and a sensing electrode.

4. The method of any one of claims 1 to 3 wherein the injection electrode and the sensing electrode are in electrically conductive contact with the first body tissue.

5. The method of any one of claims 1 to 3 wherein the injection electrode and the sensing electrode are in electrically conductive contact with the second body tissue.

6. The method of claims 1 to 3 wherein the first body tissue is a sub-dermal body tissue and the second body tissue is skin.

7. The method of claims 1 to 3 wherein the first body tissue is a sub-dermal body tissue and the second body tissue is a sub-dermal body tissue.

8. The method of any one of claims 1 to 7 wherein the impedance is measured at a plurality of frequencies in a range of 1 Hz to 10 MHz.

9. The method of any one of claims 1 to 8 wherein the body fluid is blood.

10. The method of any one of claims 1 to 9 wherein determining the amount of glucose includes comparing the measured impedance with a predetermined relationship between impedance of the sub-dermal body tissue and blood glucose level.

11. The method of any one of claims 1 to 10 wherein the injecting electrodes and the sensing electrodes are in operative connection with a microprocessor programmed to determine the amount of glucose level based upon the measured impedance.

12. The method of any claim 11 wherein the microprocessor is programmed to determine the glucose level of a subject based on a principal component analysis and a partial least squares regression analysis of the measured impedance.

13. The method of claim 11 or 12 wherein an indicator is operatively connected to the microprocessor for indication of the determined glucose level.

14. The method of claim 13 wherein the indicator comprises a visual display to the subject.

15. A method for measuring glucose in a body fluid of a subject, the method comprising:

measuring impedance of a first body tissue with two pairs of electrodes, each pair being an injection electrode for injecting electrical current into said first body tissue and a sensing electrodes for detecting the ensuing voltage of said sub-dermal body tissue, wherein said injection electrodes and said sensing electrodes are in electrically conductive contact with said first body tissue or a second body tissue;

and determining the amount of glucose in the body fluid based upon the measured impedance.

16. The method according to claim 15 wherein one pair of electrodes is in electrically conductive contact at a first position on the subject and the second pair of electrodes is placed at a second position on the subject, and wherein impedance of the sub-dermal body tissue is measured between the first and second positions.

17. The method of claim 15 wherein the injection and the sensing electrodes are in electrically conductive contact with the first body tissue.

18. The method of claim 15 wherein the injection electrodes and the sensing electrodes are in electrically conductive contact with the second body tissue.

19. The method of any one of claims 15 to 17 wherein the first body tissue is a subdermal body tissue and the second body tissue is skin tissue.

20. The method of any one of claims 15 to 17 wherein the first body tissue is a subdermal body tissue and the second body tissue is skin tissue.

21. The method of claim 19 or 20 wherein the skin is treated with saline solution prior to measuring impedance.

22. The method according to any one of claims 19 to 21 , wherein an electrically conductive gel is applied to the skin to enhance the conductive contact of the electrodes with the skin prior to measuring impedance.

23. The method of any one of claims 19 to 22 wherein the sub-dermal body tissue is muscle.

24. The method of claim 19 to 22 wherein the sub-dermal body tissue is fat.

25. The method of claim 19 to 22 wherein the sub-dermal body tissue is blood vessels.

26. The method according to any one of claims 15 to 25 wherein the body fluid is blood.

27. The method of any of claims 15 to 26 wherein determining the amount of glucose includes comparing the measured impedance with a predetermined relationship between impedance of the sub-dermal body tissue and blood glucose level.

28. The method of claim 15 to 27 wherein the injecting electrodes and the sensing electrodes are in operative connection with a microprocessor programmed to determine the amount of glucose level based upon the measured impedance.

29. The method of claim 28 wherein the microprocessor is programmed to determine the glucose level of a subject based on a principal component analysis and a partial least squares regression analysis of the measured impedance.

30. The method of claim 29 wherein an indicator is operatively connected to the microprocessor for indication of the determined glucose level.

31. The method of claim 15 wherein the indicator comprises a visual display to the subject.

32. An apparatus for monitoring glucose in a body fluid of a subject according to the method of any one of claims 1 to 31, the apparatus comprising:

at least one pair of an injection electrode for injection of electrical current into the first body tissue and a sensing electrode for detecting the ensuing voltage of said first body tissue;

said electrodes are in electrically conductive contact with the first body tissue or the second body tissue;

a microprocessor operatively connected to the means for measuring impedance for determining the amount of glucose in the body fluid based upon the impedance measurement.

33. The apparatus of claim 32 where there is one pair of electrodes.

34. The apparatus of claim 32 where there are two pairs of electrodes, each pair being an injection electrode and a sensing electrode.

35. The apparatus of any one of claims 32 to 34 wherein the first body tissue is a sub-dermal body tissue.

36. The apparatus of claim 35 wherein the sub-dermal body tissue is muscle.

37. The apparatus of claim 35 wherein the sub-dermal body tissue is fat.

38. The apparatus of claim 35 wherein the sub-dermal body tissue is blood vessels.

39. The apparatus of any one of claims 32 to 38 further comprising an amperometer, a voltmeter and source of electric current for measuring the impedance of the first body tissue between said injection electrodes and said sensing electrodes; wherein the amperometer and source of electric current are in operative connection with the injection electrodes and the voltmeter is in operative connection with the sensing electrodes.

40. The apparatus of claim 39 wherein said electrical current is provided at a plurality of frequencies in a range of 1 Hz to 10 MHz.

41. The apparatus of any one of claims 32 to 40 wherein the microprocessor is operatively connected to an insulin pump and includes means to adjust the amount of insulin flow via the pump to the subject based on the determined blood glucose level.

42. The apparatus of any one of claims 32 to 41 further comprising means for calibrating the apparatus against a directly measured glucose level of said subject.

43. The apparatus of any of claims 32 to 42 wherein the microprocessor is programmed to determine the glucose level of a subject based on a principal component analysis and a partial least squares regression analysis.

44. The apparatus of any one of claims 32 to 43 further comprising an indicator operatively connected to the microprocessor for indication of the determined amount of glucose.

45. The apparatus of any one of claims 32 to 44 wherein the apparatus is implanted in the body tissue for which the impedance is to be measured.

46. The apparatus of claim 44 wherein the indicator comprises a visual display.